

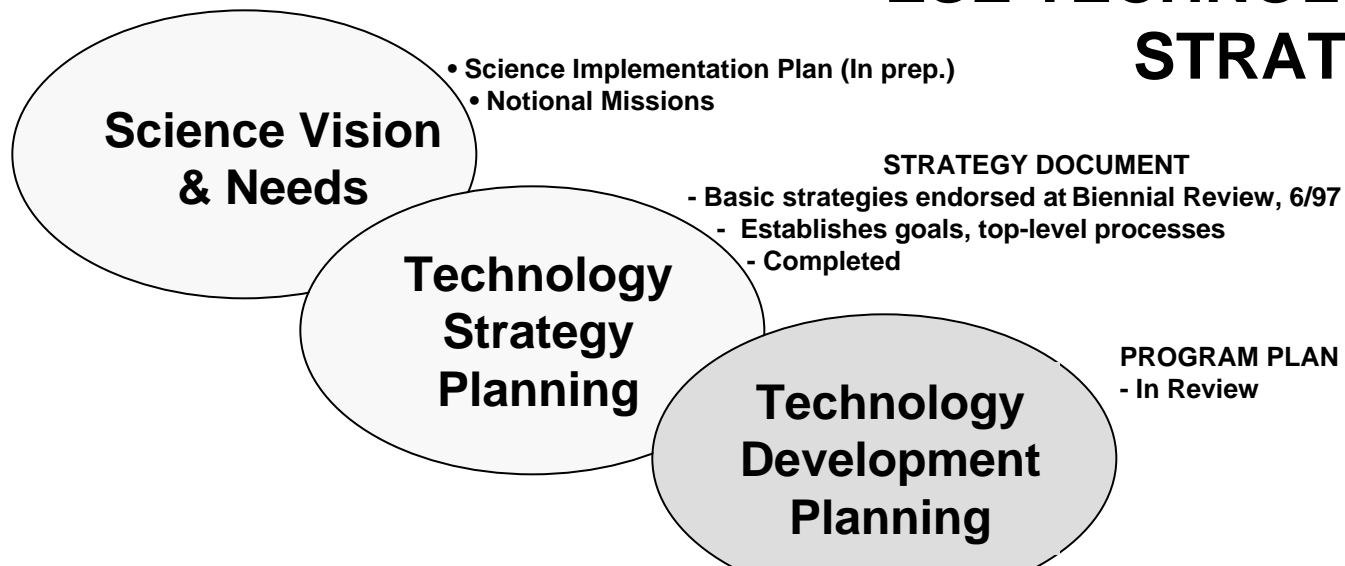


TECHNOLOGY PROGRAM PLAN

- ESE Technology Strategy
- Goals & Metrics
- Program Elements
- Program Plan Review Status
- Summary of Program Plan Comments



ESE TECHNOLOGY STRATEGY



Non-NASA Technologies	Non-ESE Technologies	ESE Sponsored Technologies
<ul style="list-style-type: none">- Government- Private industry- Academic community	<ul style="list-style-type: none">- SBIR/STTR- NIAC- Cross-enterprise- SOMO- ERAST	<ul style="list-style-type: none">- Component (all TRLs)- Focused programs (IIP, AIST)- CRSP- NMP (with SSE)- HPCC (with AE, SSE)



GOALS & METRICS

ESTP Objective

Through development and application of new technology, enable OES programs & missions to effectively and efficiently address Earth system science questions planned in the near-to-mid future and to stimulate new science programs necessary to meet longer term OES goals

ESTP Goals

1. Maintain a traceable link between science & applications objectives and technology investment

2. Ensure overall Program cost effectiveness through technology advances and application

3. Ensure the Program supports 3-year acquisition timelines for flight and ground systems

4. Ensure the Program considers near, mid and far term horizons

5. Leverage technology investments through cross-enterprise program synergy and external partnerships

ESTP Performance Metrics

- Annual ratification of the needs databases by the OES and the ad hoc Technology Subcommittee (TSC)
- Concurrence of configuration changes by the OES Lead Technologist

- Annual ratification of the Integrated Technology Development Plan by the OES
- Technology funding allocated at 60% for near, 25% for mid, and 15% for far-term research

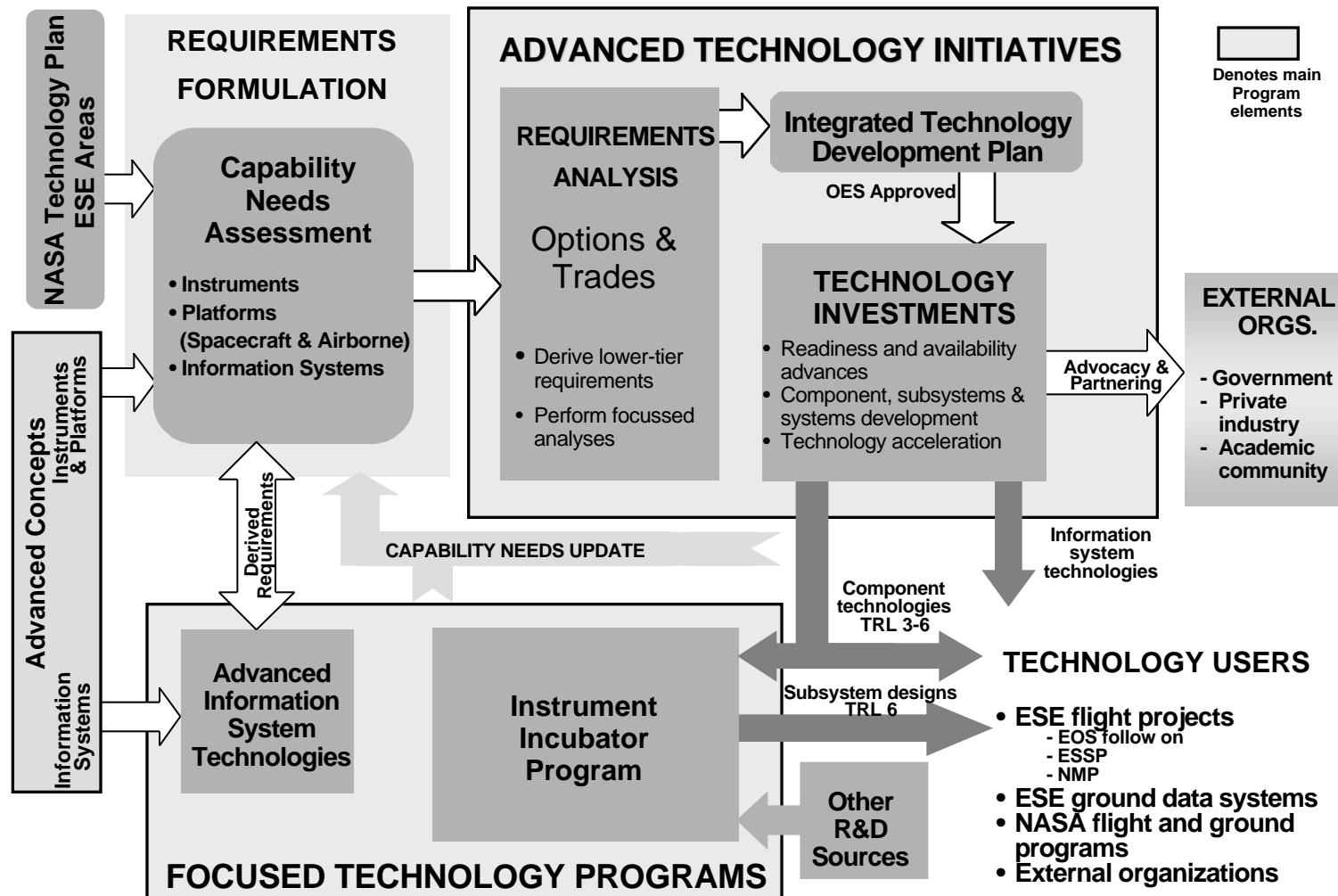
- At least 25% of development tasks advance by at least one readiness level each year
- Annual transfer of at least one technology development to a commercial entity or into operational use
- Biennial enabling of at least one new science measurement capability enabled via a technology-push development

- At least 50% of near-term technologies have a 2 to 3 years-to-launch horizon

- Annually establish at least one joint agreement within another NASA program resulting in inclusion of at least 2 ESE requirements
- Annually establish at least one joint agreement with a program external to NASA resulting in inclusion of at least 1 ESE requirement

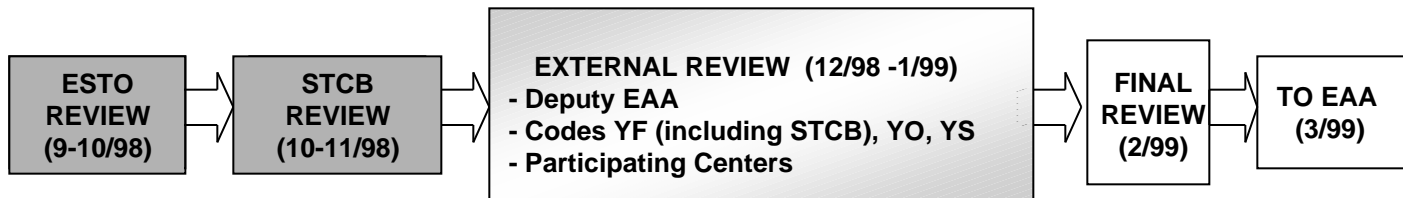


PROGRAM ELEMENT INTEGRATION





PROGRAM PLAN REVIEW STATUS



- **Key Comments from External Review**
 - Expand advocacy beyond the OES
 - Clarify Program element integration and processes
 - ESTO “East” and “West” recognition
 - Clarify ESTO relationships with other technology programs
- **Open Issues**
 - Clarify goals, goal discussions or metrics
 - Clarify Participating Center concept
 - Clarify lead role assignments to Centers
- **Resolution of Open Issues**
 - STCB round-table telecons beginning week of February 8th



SUMMARY OF PROGRAM PLAN COMMENTS



Program Plan Comments

<i>Section</i>	<i>Para</i>	<i>Comment</i>	<i>Reviewer</i>
General		<ul style="list-style-type: none"> Applications objectives, though mentioned in conjunction with science objectives in Goal 1, are not mentioned consistently with science objectives throughout the document. The plan focuses on hardware technology and minimizes “techniques” development that would allow technologies to be used to maximum advantage. There are insufficient spaceflight verification opportunities for certain technologies/techniques, esp. those that could be transferred to operational programs– NMP focuses on “high-end” technologies. 	MSFC Code YS
2.0	2.1	<ul style="list-style-type: none"> Use “Measurement Objectives” in place of the term “Missions” Change the wording in the Program’s main objective to read: “Stimulate advanced research in instrument, platform and information system technologies, and provide the OES access to experimental technologies with which to meet its near to far term Earth science objectives” 	JPL ARC
	Goal 2	<ul style="list-style-type: none"> Clarify purpose for Goal 2. Introduce the TRL concept. Goal 2 addresses the cost effectiveness of the Program investment, but does not specifically address reducing mission costs. 	ARC LeRC
	Goal 3	<ul style="list-style-type: none"> What is the rationale for choosing a “50%” metric? Who will judge availability for infusion? 	JPL
	Goal 4	<ul style="list-style-type: none"> Clarify “...a 2-3 years-to-launch horizon” and relate this to time of an AO release. 	Code YS
	Goal 5	<ul style="list-style-type: none"> A metric of 15% funding for far-term investments seems too small and out of balance with 60% for near-term and 40% for mid-term in view of the proposed objectives for far-term investments. Clarify statement, “...use of open competitions <u>whenever possible</u>...” Signed agreements do not guarantee desired outcomes and may waste funds. Metrics should be strengthened. 	MSFC, LeRC JPL JPL ARC
3.0	3.2	<ul style="list-style-type: none"> Expand Advocacy beyond the OES and ESSAAC TSC review process. Consider some NRC committees, the ESSAAC full committee, etc. 	NTPIO



<i>Section</i>	<i>Para</i>	<i>Comment</i>	<i>Reviewer</i>
4.0	4.1	<ul style="list-style-type: none"> Describe the organizational relationship between the OES Technology Program Executive (a.k.a the Lead Technologist) and the ESTO Manager? Expand the discussion on the process for the review and formalizing of the top-level requirements. 	JPL “
	4.2.2	<ul style="list-style-type: none"> Address TRL’s applicable to the Advanced Technology Initiatives element. De-emphasize mission specific requirements in Options & Trade Studies. Discuss, in general, the roles played by Participating Centers in the Options & Trade Studies Include references to EOSDIS systems in “Technology Investments” (subpara. b) Ensure NASA-funded technology projects in universities/colleges are integrated into the Program {e.g. Hampton University is doing laser crystal development} 	JPL “ LeRC ARC Code YS
	4.2.3	<ul style="list-style-type: none"> Clarify why requirements for Information Systems technologies should be listed separately and not included in the CNA. 	JPL
	4.3	<ul style="list-style-type: none"> Expand on the process for identifying far-term technology needs. Use a common flow for the processes in Figures 5, 6 & 9 to clarify interactions among Program elements. Include relationships with external organizations; e.g., the DOD; commercial interests, etc. Clarify what is meant by “. . . <u>lead roles</u> to some Centers. . .” Is it realistic for the ad hoc TSC to take on annual review responsibility for the CNA, ITDP & TIS? 	JPL NTPIO “ Code YS
	4.4	<ul style="list-style-type: none"> Add planning responsibilities to ESTO Program Manager responsibilities. 	NTPIO
	4.5	<ul style="list-style-type: none"> In addition to recognizing Centers of Excellence and Enterprise lead role Centers, add the category: “Areas of specialized technology/technical expertise”, to recognize Centers that do not have formally designated roles yet have the expertise. 	LeRC

2.



	4.6 Table 1	<ul style="list-style-type: none"> Add MSFC's involvement with Microwave Radiometers, Aircraft Instruments, & Information Systems Technologies Add LeRC's involvement with Airborne Technology {NOTE: LeRC is recognized for its Spacecraft Technology expertise; the omission is a typo} Assignments of lead Centers should be discussed within the STCB before the plan is released. What is the rationale for lumping together UV, visible, and IR wavelengths in radiometers & spectrometers? There is no column for far IR or sub-millimeter wavelengths. What is the rationale for having lead Centers for some instrument categories and not others? 	MSFC LeRC LaRC Code YS
	4.6	<ul style="list-style-type: none"> Discuss more specifically the "distributed ESTO management" approach (ESTO East, West, others?) Discuss how Participating Center Technology Representatives are selected. Clarify the TST membership. {NOTE: LeRC recommends TST membership include a LeRC representative.} 	JPL, LaRC ARC Code YS, LeRC
5.0	new para. 5.1 5.2	<ul style="list-style-type: none"> Include guidelines on coordination with other NASA technology programs (i.e. coordination among NTPIO offices and external-to-NTPIO organizations). Annual review of top-level requirements; i.e., the CNA, seems too frequent. How do ITARS restrictions affect ESTO activities? {NOTE: Teaming with foreign partners can have the appearance of exporting technology and raises the issue of export licenses} 	NTPIO Code YS JPL
6.0	Fig. 8	<ul style="list-style-type: none"> Add more milestones to Figure 8, Program Schedule, particularly milestones for NRA releases. 	NTPIO, JPL
7.0			



8.0	Table 2 Figure 9 8.2	<ul style="list-style-type: none"> Emphasize the ESTO PM's responsibility to coordinate activities with the Cross-enterprise program by adding a bullet in the Strategic Planning column. Distinguish between phases and processes in Table 2 and expand the discussion in the text. Clarify the distinction between inputs & outputs of the boxes, and activities within boxes. Expand the discussion on TRL verification. Clarify the process for moving technologies from the advanced concept element (TRL 2) to the Advanced Technology Initiatives element (TRL 3) 	LeRC JPL “ “ “
9.0	9.1, .2 9.2	<ul style="list-style-type: none"> Discuss specific relationships between the ESTO and other organizations involved with technology development; i.e., other NTPIO programs (SBIR, Cross-enterprise, NIAC) and other NASA programs (NMP, HPCC, SOMO, CRSP, ERAST). Diagram how all these programs interrelate. The programs listed in para. 9.1 and 9.2 should be combined under one heading since no synergy exists between the ESTO and its sister NTPIO offices in para. 9.1. Add any technology programs sponsored by the Space Transportation Program that address launch system capabilities and mission/spacecraft capabilities to para. 9.2. 	NTPIO, JPL, Code Y LaRC LeRC
10.0	Table 3	<ul style="list-style-type: none"> Transfer the information in Table 3 to the text and eliminate the table. 	LaRC